Energy Meter EM24 RS485 manual

1. Introduction and usage

This document is the manual for the EM24 three phase max 65 A per phase Energy Meter. As shown in the picture above.

The Energy Meter can be used as a:

1. Grid meter, and used as control input for an ESS System.
2. Measure the output of a PV Inverter
3. Measure the output of a AC Genset
4. (deprecated) ~~Grid meter, used as control input for a~~ Hub-4 system

For all above usages, the meter is connected to the GX device. For a full overview of all available & GX-compatible Energy Meters, read the Energy Meters Start page and Energy Meter Product page.

This chapter concerns the EM24 models using an RS485 data connection.

For wiring RS485, there are two options:

1. Direct connection, either using the RS485 to USB interface with 1.8m cable length, or the 5.0m cable.
2. Wireless connection via Zigbee

The REL200100000 is the EM24DINAV93XISX from Carlo Gavazzi. Other EM24 models from Carlo Gavazzi can also be used, as the communication is the same. For example the EM24DINAV53DISX, which uses Current Transformers and can therefore work in systems > 63A per phase, has been tested and works. Note that this model is not stocked by Victron Energy, we recommend to purchase it locally.

2. AC Wiring and front selector

3-phase diagram:

When used to measure a PV Inverter, terminals 1, 4 and 7 should face the PV inverter to ensure correct direction of current and power.

Single phase single function diagram:

Note the jumper between terminals 1 and 4. You do not need this connection if you have the version AV2 of the sensor:

The diagram shows the wiring when used as a grid meter.

To measure a single phase PV inverter in a 3-phase system, connect all 3 phases to the grid phasing terminals (3, 6 and 9). Now you can chose on which phase you want the PV inverter by connecting the L1 line of the PV inverter to terminal 1, 4 or 7.

Single phase dual function

If you wish to use a three phase meter in a single phase installation to measure the grid on one input and PV inverter output on another phase, use the ET340 instead. See Energy Meters FAQ, Q5 for more details. Do not use the EM24 meter for such system.

If you understand the limitations of this meter in this configuration and wish to proceed anyway, see this diagram -

power_meter_1phase_pv_dec2016.png

Front selector

Change the front selector so it is not in the locked state. This allows it to be automatically configured by the GX Device. The front selector is located next to the display as indicated in this image:



3. Connection to GX device

Option A: wireless Zigbee connection

Step 1.

Connect the Zigbee to USB converter to the GX device using the supplied USB cable. A few seconds after connecting, the active LED should be on and the TX/RX LED should be blinking (the converter takes its power from the GX device, so the GX device needs to be switched on as well).



Step 2.

Connect the Zigbee to RS485 converter to the EM24 energy meter:

Zigbee Converter	Energy meter
GND	Terminal 43
A	Terminal 42
B	Terminal 41





Step 3.

Make sure only one Zigbee device is powered up right now: the Zigbee to USB converter connected to the GX device. Power down all others. *If you don't do this, the Zigbee to RS485 converter may be*

connected permanently to another Zigbee device.

Step 4.

Connect the 12V DC power supply to the Zigbee to RS485 converter. When the power is switched on, check the LEDs again.

note on old and new zigbee converters

Please note that there is a new zigbee converter available now, that is -not- backwards compatible with the old converters. If you have a non compatible set, please ask your supplier for a correct version.

'old' type:

ASS300400100 - Zigbee to RS485 converter partnumber: DRF2619C

ASS300400200 - Zigbee to USB converter partnumber: DRF2618A

'new' type:

ASS300420100 - Zigbee to RS485 converter partnumber: DRF2659C

ASS300420200 - Zigbee to USB converter partnumber: DRF2658C

note on GX firmware versions:

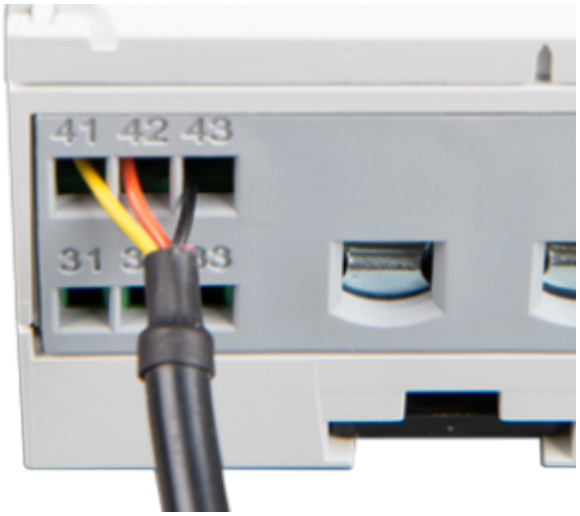
for the new type Zigbee converters, Venus OS v2.54 is the minimum required software version

Option B: Wired connection to GX device

Connect the Energy Meter to the GX device using the USB to RS485 cable. The RS485 to USB interface cable between the GX device and the Energy Meter can be extended up to 100 meters; make sure that the extensions of the Data+ (orange) and Data- (yellow) wires form a twisted pair.

RS485 Converter	Energy meter	Suggested CAT5 extension
Yellow (Data-	Terminal 41	Orange/White
Orange (Data+	Terminal 42	Orange
Black (GND)	Terminal 43	Brown

The red, green and brown wire coming out of the USB to RS485 cable are not used



The red, green and brown wire coming out of the USB to RS485 cable are not used.

Note on cable length extensions and bus termination

To ensure signal integrity and robust operation, particularly ensure that;

Extension cabling complies with the minimum cross-sectional area specifications in the USB to RS485 data sheet.

Extension cabling has appropriate shielding and twisted pair cores

The original cable attached to the Victron RS485 to USB interface is reduced to a maximum length of 20cm in installations where the total cable length is over 10m or there are installation/site specific interference issues – in this case appropriate/high quality cabling should be used for the entire cable length, rather than only for the extension length.

Cabling is installed separated/away from the main DC or AC power cabling.

All wiring is properly terminated (including unused wires) and properly isolated from weather/water ingress.

RS485 networks are traditionally terminated at both ends with 120Ω terminators. This is not required if the cable length is short and you are using the Victron supplied RS485 to USB lengths, but may be required if they are extended for longer cable runs.

For detailed wiring/installation notes and specifications refer to the Victron RS485 to USB interface cable 'Datasheet'.

4. Configuration

After proper connection and powering up, the meter will be visible on the GX device in the Settings → Energy Meters menu:

The menu lists every meter found. And in the gray box at the right side it shows the configured function.

After selecting a meter, see its detailed settings:



5. Multiple Energy Meters in one system

There are 3 options to connect multiple Energy Meters:

1. Each wired to a separate RS485-USB converter. Which are then each plugged into a separate USB socket on the GX device.
2. 2 meters wired on to one RS485-USB converter. In this case the modbus address of the additional meter needs to be changed, so each is unique. See chapter 6.
3. Wireless connection: the additional meter is connected to an additional Zigbee to RS485 converters. There is then no second Zigbee to USB interface required. It is necessary to change of the modbus address of one of the AC sensors, see chapter 6.

Besides adding an extra sensor, it is also possible, in a single phase installation, to use the, unused, second phase to measure the output of the PV Inverter. See see the AC Wiring chapter in this manual.

6. Changing the modbus address

1. Press the joystick down until until the display shows 'Pass'. The joystick on the right side on the display, above the front selector).
2. Press the joystick down again and release immediately.
3. Press the joystick right several times until 'Address' appears. Press the joystick down. Now you can adjust the address by pressing the joystick up and down. Set it to 2.
4. Press down again. 'Baudrate' appears.
5. Press down again twice. 'Address' appears again.
6. Press right until 'End' appears.
7. Press down. The display now shows measurements again.

Note that only one extra Energy meter can be added: the systems works only with address 1 (the default) and 2.

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